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ON GRADE STEERS OF DIFFERENT BREEDS

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ING GRADE STEERS OF DIFFERENT BREEDS

The experiment consists in the rearing of grade animals of different breeds from birth to early maturity. The animals were chosen from breeds whose fitness for beef production has been recognised to some extent by at least some sections of the community. The experiment commenced in the autumn of 1889 and will be completed in the autumn of 1890. The main features when the animals have reached the age of two years will be given in the next bulletin. The portion of it covered by this bulletin brings them only to the completion of their first year.

The primary objects of the experiment were to ascertain:—1. The cost of rearing grade steers, for purposes of beef production, from birth until the period of early maturity, when fed upon a heavy ration. 2. The comparative cost of rearing grade steers on whole and skim milk respectively, and the effects of these on the animal after the termination of the milk period of feeding. 3. The comparative cost of producing beef from well-graded and from scrub animals respectively. The chief of the secondary objects were to ascertain:—1. The relative cost of rearing animals of different breeds during different periods of growth when fed upon a heavy ration. 2. The relative daily gains; and 3. The total relative increase in weight.

In the effort to secure these objects it was thought that if grade animals were secured of the different breeds which to a greater or lesser extent have been used for making beef, that the results would be more valuable than if they were of the same grade. They were secured therefore on this basis.

ANIMALS SELECTED. The animals secured, eight in all, were obtained from leading breeders and wherever they were got of a suitable character. Each individual was the offspring of a pure registered sire, except in the case of the native or the dam a common grade cow. The effort to secure them as early in the birth period as possible was also fairly successful, except in the case of the Galloway grade, which was fifty-three days old when it reached the farm. The Shorthorn grade to which was fed whole milk was fourteen days old, and the others were all less than thirty days old. The more important particulars regarding these animals are given in the subjoined table. The color generally speaking is typical of the breed of the sire.

Table 1 gives particulars regarding the breeding and the ing characteristics of the different animals :

Grade.	Date when calved.	Sire.	Dam.	Character of stock.
Galloway...	Nov. 2, 1889	Rajah of Brooke (3970).	$\frac{1}{2}$ Shorthorn and $\frac{1}{2}$ Canadian.	Short legged, blocky.
Shorthorn..	Dec. 22, 1889	Methlick Hero, =2723=(imp.)	A Shorthorn grade.	Rather leggy, Shorthorn.
Aberdeen Poll.	Jan. 1, 1890	Runnymede 2nd, 5220.	A common two-year-old heifer.	Not robust, developed.
Hereford...	Jan. 5, 1890	King Hal.	A good common cow.	Short legged, heavy.
Devon	Jan. 8, 1890	Duke (947)	A Shorthorn grade.	Neatly squared frame.
Holstein...	Feb. 17, 1890	African Prince, (H. F. H. B.) 1270.	A common cow.	Large size, rather in the bone.
Shorthorn..	April 1, 1890	Macduff.....	A Shorthorn grade.	Medium, neatly framed.
Native or scrub.	April 16, 1890	A native bull of the range type.	A three-year-old native.	Narrow, flat ribbed, long legs.

FOOD AND FEEDING. Milk was fed to each of the animals until six months old. Of this they were given a fair allowance, not all they would take. They were all given whole milk as shown in Table II, except one of the Shorthorn grades, which was given skim milk. They were fed by hand morning and evening. The skim milk was warmed by heating before being fed. The animals were also fed in addition to the milk were clover hay cut, green fodder in season, and meal consisting of equal proportions by weight of oats, wheat screenings and bran. None of the meal was given with the milk. During the second six months they were fed green food, roots and meal. The hay was similar in kind to that mentioned above. The green fodder consisted of oats and clover and millet, as these crops came in season. The roots comprised turnips and mangels. They were not fed at the same time and were sliced before being fed. The meal during the first six months of this period consisted of peas, oats and wheat screenings ground, bran and oil cake in the proportions of 4, 4, 4, 4 parts respectively. During the next three months they received a meal ration of peas and oats ground and bran, in the proportions of 2, 2 and 1 respectively. The meal throughout was fed dry, along with the hay, which was cut. The aim was to give each animal about the same quantity of meal, but some would not take so much as

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	Character of stall
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Short le	heavy
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ch accounts for the difference in the amount eaten as given in the joined table. The food was given in three meals per day, and they usually had access to water at will. The animals were kept in stalls until they were about six months old. After that time they were tied in stalls and were allowed to exercise about one hour a day in the barnyard. The first six months will be referred to as the first period, and the next six months as the second period.

FOOD EATEN. It will be observed in the subjoined table that the consumption of food was large, more especially with the more concentrated and costly rations, as milk and meal, but this was in keeping with the objects of the experiment, as already expressed. The kinds of meal fed were doubtless too concentrated and costly, and the quantities too large to give the best results financially.

Table II gives the consumption of food during the first and second periods respectively :

Grades.	First six months.				Second six months.			
	Milk.	Hay.	Meal.	Green fodder.	Hay.	Meal.	Green fodder.	Roots.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Loway.....	2091.5	215.5	281.5	20.0	721	1489	826	511
Shorthorn.....	4383.6	107.0	196.5	68.0	855	1779	615	1575
Arden Poll.....	4182.2	113.0	195.5	57.0	717	1500	857	906
Reford.....	4154.0	140.0	243.5	66.0	788	1754	561	1500
Don.....	3611.4	112.0	134.5	70.5	912	1682	648	1541
Astein.....	4475.5	110.0	190.5	125.5	884	1744	219	2377
Average (six animals).	3816.4	132.9	207.0	67.8	812.8	1658	604.3	1401.7
Shorthorn.....	4691.5	175.5	188.0	212.0	1059	1662	3261
Sub or native.....	3761.7	71.5	92.4	148.0	757	1246	2898

* Fed on skim milk.

It has been already mentioned that the Galloway grade did not reach the farm until 53 days old. Prior to that time he was suckled by the dam. The estimate for the consumption of whole milk by this animal during that period was the average of the consumption by all the other animals which were given this ration. It will be noticed that the total consumption of milk by this calf was small relatively. This was owing to the fact that he would not suck it regularly, but made up for the deficiency apparently in the consumption of hay and meal. The Shorthorn grade to which skim milk was fed, took more of this in quantity than the average

grade consumed of whole milk, and also more of hay and roots, but little less of meal. The native or scrub consumed considerably more than the average of all the food factors, except roots.

WEIGHTS. Table III gives an analysis of weights.

Grades.	Weights at end of—		Daily increase during—		
	First six months.	Second six months.	First six months.	Second six months.	First two months.
	lb.	lb.	lb.	lb.	lb.
Galloway	457	800	2.51	1.86	2.19
Shorthorn	530	890	2.91	1.96	2.44
Aberdeen Poll	485	754	2.66	1.46	2.07
Hereford	545	900	2.99	1.93	2.47
Devon	434	803	2.38	2.01	2.20
Holstein	537	883	2.95	1.86	2.42
Average (six breeds).	498	838.3	2.73	1.85	2.30
*Shorthorn	454	848	2.49	2.16	2.32
Scrub or native	386	700	2.12	1.76	1.92

*Fed on skim milk.

NOTE. In all the figures given in Table III the weight at birth is included. It was impossible to ascertain the birth weight owing to the way in which the calves were obtained.

It will be observed that at the close of the first period, the animal to which skim milk was fed was but forty-four lb. less than the average grade in weight, while he weighed sixty-eight lb. more than the native or scrub. At the end of one year he weighed 9.7 lb. more than the average grade, and 148 lb. more than the native or scrub. The latter weighed 112 lb. less than the average grade at the end of the first period, and 136.3 lb. less at the end of the second period. It will also be observed that the lightest animal at the end of both periods is the native or scrub.

ESTIMATED VALUE OF THE FOOD. The fodder, the grain and the roots were estimated at the current market values in Guelph, and the cost of marketing from an Ontario farm under average conditions, (see Bulletin LXVIII, p. 5). The home value put upon the hay, therefore, when cut, was \$5.00 per ton; the green fodder \$2.00 per ton; the oats 24½ cents per bushel; the peas 47 cents; the whole screenings 30 cents, and the roots when sliced 8 cents. The grain of the grain was put at six cents per 100 pounds. The hay

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lb.	lb.
1.86	2.19
1.96	2.44
1.46	2.07
1.93	2.47
2.01	2.20
1.86	2.42
1.85	2.30
2.16	2.32
1.76	1.92

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oil cake reckoned as delivered at the average Ontario farm
put at \$12.80 and \$26.66 $\frac{2}{3}$ per ton respectively. The home
put upon the whole milk was 60 cents per 100 pounds. This
conclusion was reached by valuing the milk delivered at an average
Ontario factory at 70 cents per 100 pounds, and allowing 10 cents
per 100 pounds for delivering the same. The price allowed for
giving the milk may be considered a shade high for some localities.
The home value put upon the skim milk, the buttermilk reckoned
at the same rate, was 15 cents per 100 pounds. This conclusion
was reached by deducting the value of the butter, less the cost of
making, from the home value of the whole milk. It was estimated
that the average yield of butter from 100 pounds of whole milk in
a farm dairy is 3 $\frac{3}{4}$ lb., that the cost of making is 3.9 cents per
pound, and the average price obtained for it is 16 cents per pound.
It will be observed that in all probability a profit has already
been made on the marketable food used, providing it has been
grown upon the farm, as in this experiment the food was charged
at the full market values, less the cost of marketing from an average
Ontario farm. This profit will be represented by the difference
between the cost of growing and the market value put upon it.

VALUES. Table IV gives the financial results at the close of the
period:

Grade.	Cost of—			Total Cost.	Value of—		Total value.	Gain + or Loss—
	Animal at birth.	Food.	Attendance.		Animals when six months old.	Manure.		
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Loway	2 00	11 79	2 60	16 39	25 14	1 27	26 41	+10 02
Northorn	2 00	28 11	2 60	32 71	29 15	1 27	30 42	- 2 29
Merdeen Poll. ...	2 00	26 89	2 60	31 49	26 68	1 27	27 95	- 3 54
Reford	2 00	27 93	2 60	32 53	29 98	1 27	31 25	- 1 28
Don	2 00	23 01	2 60	27 61	23 87	1 27	25 14	- 2 47
Stein	2 00	28 66	2 60	33 26	25 51	1 27	26 78	- 6 48
Average (grade of six breeds).	2 00	24 40	2 60	29 00	26 72	1 27	27 99	- 1 01
Northorn	2 00	9 06	2 60	13 66	21 57	1 27	22 84	+ 9 18
Sub or native ..	1 00	23 58	2 60	27 18	14 48	1 27	15 75	-11 43

*Fed on skim milk.

No conclusions should be drawn from this table without carefully
weighing all the facts contained in the bulletin.

The value put upon the animals at birth was of necessity an estimate that would be about the real value when they were dropped. The cost of attendance was reckoned on the basis that one man would feed and care for 75 calves per day under ordinary conditions when the food has all been made ready.

The following was the valuation put upon the different animals at the experiment, viz.:—Galloway grade, $5\frac{1}{2}$ cts. per pound live weight; Shorthorn grade, $5\frac{1}{2}$ cts.; Aberdeen Poll grade, $5\frac{1}{2}$ cts.; Hereford grade, $5\frac{1}{2}$ cts.; Holstein grade, $4\frac{3}{4}$ cts.; Shorthorn grade fed on skim milk, $4\frac{3}{4}$ cts., and native or scrub, $3\frac{3}{4}$ cts. This valuation was made at our request by Mr. James Millar and Mr. A. White, live stock dealers, Guelph. Notwithstanding that each of those gentlemen estimated separately, the respective valuations made by them were in substantial agreement.

The estimated amount of manure made per animal during the first period was $3,891\frac{1}{2}$ lb. This was reckoned as worth \$1.00 per ton. From the sum thus obtained the deduction was made of $903\frac{1}{2}$ lb. of straw allowed for bedding, the home value of which was put at \$1.50 per ton. This estimate was based upon actual results obtained from a test conducted simultaneously with another calf, and mainly with the object of ascertaining the amount of manure produced by a cattle beast during different stages of its growth.

The following facts stand out prominently at the close of the period, viz.:—1. The much greater cost of a whole milk ration with adjuncts, as compared with a skim milk ration with the same. With the first the average cost of the food was \$24.40 per animal, and with the last \$9.06, or nearly two-thirds less. 2. That although in the comparison just drawn there is a difference of \$15.34 in the cost of the food, the difference in the value of the animals at the close of the periods is only \$5.15. 3. The small amount of milk consumed by the Galloway grade after the first 53 days reduced the cost of the ration fed to him to \$11.79, or \$12.61 less than the average, and yet the difference in the average gains per day was not very marked. This would seem to indicate that a liberal whole milk ration is not an absolute necessity after the first two months of the life of the animal, and that the nature of the ration given affects the cost of production more than the particular improved breed with which the animal is connected. 4. The difference in the total value of the animal fed on skim milk, as compared with the average of those fed on whole milk, cost considered, is \$10.19 in favor of the former as compared with the native or scrub \$20.61.

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Grades.	Cost of—			Value of—			Total value.	Gain + or Loss.—
	Animal at birth.	Food.	Attendance.	Total cost.	Animals.	Manure.		
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
oway	2 00	27 22	5 63	34 85	44 00	6 00	50 00	+15 15
thorn	2 00	47 53	5 63	55 16	48 95	6 00	54 95	- 0 21
arden Poll...	2 00	43 02	5 63	50 65	39 59	6 00	45 59	- 5 06
ford	2 00	46 47	5 63	54 10	49 50	6 00	55 50	+ 1 40
on	2 00	41 62	5 63	49 25	44 17	6 00	50 17	+ 0 92
tein	2 00	48 63	5 63	56 16	41 94	6 00	47 94	- 8 22
verage (grades of six breeds).	2 00	42 40	5 63	50 03	44 69	6 00	50 69	+ 0 66
thorn	2 00	29 59	5 63	37 22	40 28	6 00	46 28	+ 9 06
b or native .	1 00	39 61	5 63	46 24	27 13	6 00	33 13	-13 11

*Fed on skim milk.

he close of the milk ration was the same. With per animal, and that although 5.34 in the cost at the close of the milk consumption and the cost of the average, and yet not very marked. The milk ration is not the life of the facts the cost with which the value of the average of those of the former and conclusions should be drawn from this table without carefully considering all the facts contained in the bulletin. During the second period the allowance for attendance is the same as the previous one, with the difference, that one person is supposed to care for 60 animals instead of 75, as in the former period. The animals were valued at the same rate per pound live weight as at the close of the milk period. The amount of the manure made per animal was put at 9,996 lb. and it was reckoned at \$1.25 per ton. From the sum thus obtained there was deducted 2,021½ lb. straw, as in the former instance. This estimate was also based upon the results obtained as in the first reckoning of the manure. It will be observed that the animal fed on skim milk cost \$12.81 less than the average grade fed on whole milk, and \$9.02 less than the native or scrub, whereas he gave a net gain of \$9.72 in advance of the former, and of \$22.17 in advance of the latter. While the native or scrub cost \$3.79 less than the average grade, the net gain given by him was also \$17.56 less, that is to say, he cost \$17.56 more than the former when one year old. He not only made the lowest gain per day, but was also rated the lowest by the value.

CONCLUSIONS. The following are a few of the conclusions that may be drawn from the experiment :

1. That we should be slow to draw conclusions as to the relative value of the different improved breeds for making beef as the food and individuality of the animal exert marked influences.

2. That the behavior of the Galloway grade gives countenance to the idea, that when a calf has been fed liberally on the dam for about two months, a milk ration is not indispensable after that period.

3. That the average grade of the different breeds in the experiment when well fed, will make a daily gain of about one pound during the first year, when the weight at birth is included.

4. That animals without improved blood are not capable of making gains so rapidly as those of good breeding, though fed with the same liberality.

5. That a young cattle beast fed on a skim milk ration with adjuncts, may be made to weigh almost as much when one year old as one of similar breeding fed on a whole milk ration with adjuncts similar in kind.

6. That the cost of making beef from young animals on which a whole milk ration has been fed, is much greater relatively than from those to which a skim milk ration has been given.

7. That while making beef from grade calves up to the age of one year is highly profitable when they are fed upon a milk ration followed by a heavy meal ration, that but little profit can be obtained when they are fed upon a whole milk ration followed by the same.

8. That some animals are more capable of producing beef of a higher quality than others.

9. That it is decidedly unprofitable to attempt to make beef from native or scrub stock, even when the conditions are all favorable.

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